Humans Return to the Moon

INTRODUCTION

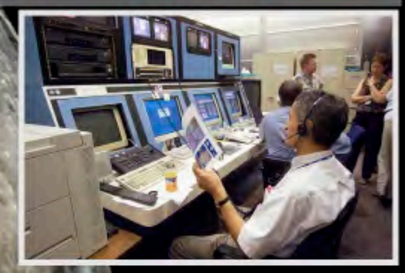
The diagnosis and management of acute health problems in space is problematic due to limited training of the Crew Medical Officer (CMO), limited diagnostic resources, and a lack of reference information on the impact of micro-gravity associated anatomic changes on medical diagnosis. There is no planned radiological capability aboard the International Space Station (ISS) however, an ultrasound system is operational in the Human Research Facility. The patient condition database ranks the risk of probable incidence versus impact on mission and health. Recent terrestrial investigations suggest expanded clinical applications of ultrasound which could be used to diagnose over 75% of these conditions.

INTERNATIONAL SPACE STATION

CONTRIBUTORS

S. A. Dulchavsky
Henry Ford Hospital, Department of Surgery,
Detroit, Michigan

A. E. Sargsyan
D. R. Hamilton
D. Ebert
S. Melton
K. Garcia
Wyle Laboratories, Houston, Texas

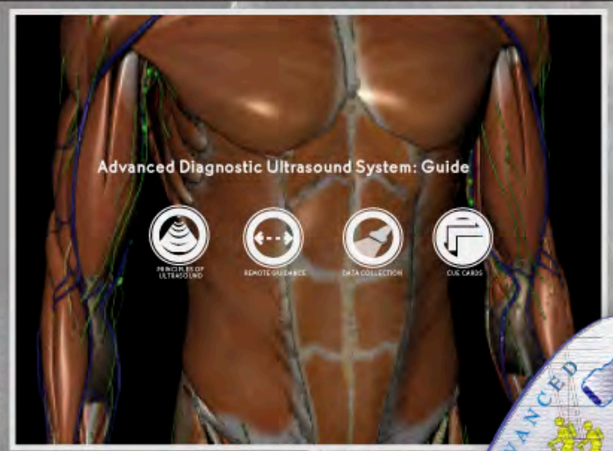


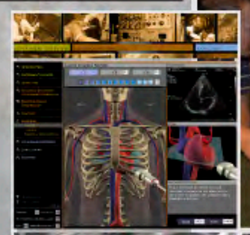
There and back again...

REMOTE MEDICAL CARE
SPACE TO EARTH

ADVANCED DIAGNOSTIC ULTRASOUND SYSTEM

Guidance





ADVANCED DIAGNOSTIC ULTRASOUND SYSTEM
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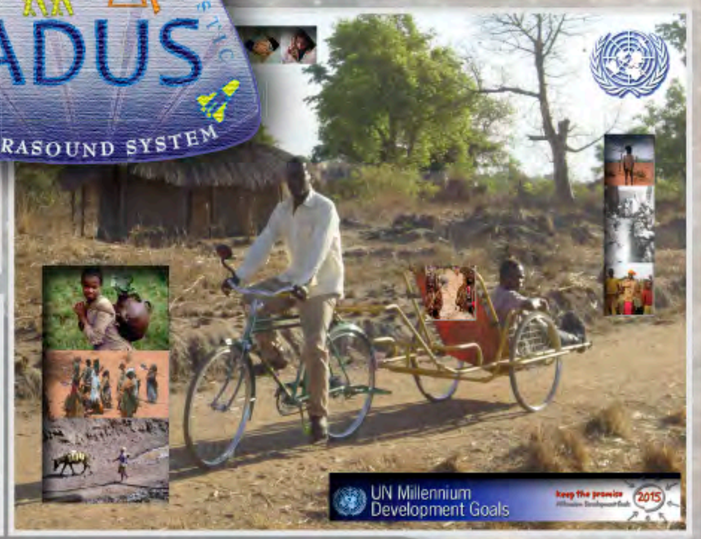
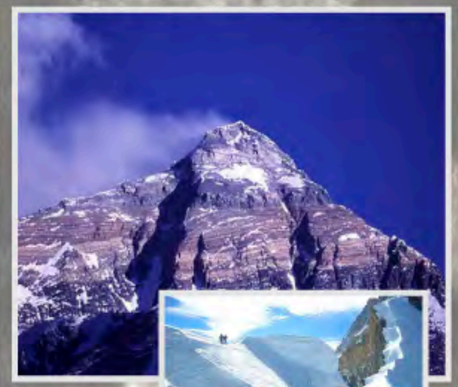


EARTH APPLICATIONS

Mount Everest



Devon Island

CONCLUSION

The unique constraints imposed by training and equipment limitations and the space environment require the development of novel diagnostic strategies for crew member health problems including the expansion of ultrasound. We have demonstrated the accuracy of ultrasound in a wide variety of aerospace relevant clinical conditions when performed and interpreted by experts. Recent ISS experiments have shown that just-in-time trained astronaut crew-members, augmented by on-board proficiency enhancement, can acquire complex, diagnostic quality ultrasound images. The expansion of just-in-time ultrasound training to autonomous ultrasound operation coupled with enhanced on-site interpretative capabilities would significantly expand the medical diagnostic capabilities during exploratory class space missions. The majority of the diagnostic training algorithms we are investigating are readily transferable to terrestrial medicine including rural and military applications and would provide a significant, clinically relevant advance in space medical capabilities with profound Earth-based ramifications.